A NEW HYBRID GENUS AND 12 NEW COMBINATIONS IN NORTH AMERICAN GRASSES

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ABSTRACT

One new hybrid genus, ×**Pascoelymus** = *Pascopyrum* × *Elymus*, and 12 new combinations are presented for North American grasses. Six of the new combinations are for hybrids in the *Triticeae*. *Stipa arnowiae* is transferred to *Achnatherum* and *Hystrix californica* (≡ *Elymus californicus*) to *Leymus*. *Agropyron riparium* is recognized as a subspecies of *Elymus lanceolatus*; *Ammophila champlainensis* is reduced to a subspecies, based on the findings of others, and the previously recognized subspecies of *Pseudoroegneria spicata* are reduced to forms. Reasons for the changes are provided.

RESUMEN

Se presenta un nuevo género híbrido, ×**Pascoelymus** = *Pascopyrum* × *Elymus*, y 12 combinaciones nuevas de gramíneas norteamericanas. Seis de las nuevas combinaciones son de híbridos en *Triticeae*. *Stipa arnowiae* se transfiere a *Achnatherum* y *Hystrix californica* (≡*Elymus californicus*) a *Leymus*. *Agropyron riparium* se reconoce como una subespecie de *Elymus lanceolatus*; *Ammophila champlainensis* se reduce a una subespecie, basándonos en los hallazgos de otros, y la subespecie reconocida previamente de *Pseudoroegneria spicata* se reduce a formas. Se aportan razonamientos de los cambios.

INTRODUCTION

Volume 24 in the *Flora of North America* series will be the second of the two volumes on grasses. Its completion requires publishing the following 12 names. Eleven of the 12 new combinations are for previously recognized taxa; one is a new hybrid genus.

Six of the new combinations, and the new genus, are for hybrids in the *Triticeae*. Identifying the parents of hybrids without knowing which species were present in the vicinity is always difficult. In most instances, I have accepted the parentage suggested by previous workers when naming these taxa; in one instance, I have felt compelled to disagree. The known distribution of many of these hybrids is limited. The remaining six names affect non-hybrid taxa. Two reflect a generic change and four a change in rank.

I have attempted to examine type material of all the taxa treated. As indicated below, however, this has not always been possible. All the taxa mentioned will be described and illustrated in the *Flora of North America* volume 24. The

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illustrations will also be available at http://herbarium.usu.edu/webmanual/. To the extent permitted by the institutions that own them, photographic images of the type specimens examined are also available via this site and will be available via TROPICOS. The images include close ups of individual parts in addition to images of the whole specimen.

NOMENCLATURAL TREATMENT

POEAE

Ammophila breviligulata subsp. **champlainensis** (F. Seym.) Walker, Paris & Barrington ex Barkworth, comb. nov. BASIONYM: *Ammophila champlainensis* F. Seym., Sida 2:349. 1966. TYPE: U.S.A. NEW YORK: Lake Champlain, Au Sable Point, in sand, 3 Jul 1902, *Nellie F. Flynn s.n.* (HOLOTYPE: VT).

Walker, Paris, and Barrington (1998) reported that *Ammophila breviligulata sensu stricto* Fern. and *A. champlainensis* differ completely in glume length and flowering time, and tend to differ in inflorescence length. They noted, however, that the morphological and molecular uniformity of *A. champlainensis*, combined with the prevalence of vegetative reproduction in both taxa, is consistent with the hypothesis that all populations of *A. champlainensis* are derived from a single genetic individual. For this reason, they recommended acknowledging the distinction between the two taxa at the subspecific, rather than specific level. I present the new combination here so that it may be used in volume 24 of the *Flora of North America*.

STIPEAE

Achnatherum arnowiae (S.L. Welsh & N.D. Atwood) Barkworth, comb. nov. BASIONYM: *Stipa arnowiae* S.L. Welsh & N.D. Atwood, *Utah Fl.* (ed. 3):799. 2003. U.S.A. UTAH. Kane Co.: T43S, R4W, S 13, ca 19 mi E of Johnson Canyon Jct; pinyon-juniper-sagebrush-community at 1740 m, on white, gypsiferous member of the Moenkopi Formation, 30 May 2001, *S.L. Welsh & T. O'Dell 28062* (HOLOTYPE: BRY; ISOTYPE UTC-245001!).

This taxon is very similar to *Achnatherum hymenoides* (Roem. & Schult.) Barkworth, differing in having loosely contracted panicles with non-divaricate branches.

TRITICEAE

×**Elyleymus hultenii** (Melderis ex Hultén) Barkworth, comb. nov. BASIONYM: ×*Agroelymus hultenii* Melderis ex Hultén, Ark. Bot., n.s. 7(1):21. 1968. *Agropyron alaskanum* var. *arcticum* Hultén, Acta Univ. Lund., n.s. 38: 257. 1942. TYPE: U.S.A. ALASKA: Deering, *J.P. Anderson* 4790 (HOLOTYPE: ALA!).

Hultén (1968) listed the parents of this hybrid as *Agropyron boreale* subsp. *alaskanus* (Scribn. & Merr.) Melderis and *Elymus arenarius* subsp. *mollis* (Trin.) Hultén. The new combination is needed because these two species will be treated as *E. alaskanus* (Scribn. & Merr.) Á. Löve subsp. *alaskanus* and *Leymus mollis* (Trin.) Pilger, respectively, in the *Flora of North America* vol. 24.

Although Hultén (1968) listed Melderis as the author of the name ×*Agroelymus hultenii*, he did not explain Melderis' contribution in the article. For this reason, the authorship is "Melderis ex Hultén" rather than "Melderis in Hultén". If using short form citations, it would be Hultén.

×**Elyleymus ontariensis** (Lepage) Barkworth, comb. nov. Basionym: ×*Agroelymus ontariensis* Lepage, Nat. Can. 79:254–257. 1952. Type: CANADA. Ontario: James Bay, Riv. Attawapiskat, 21 Aug 1946, *A. Dutilly & E. Lepage 16,423* (holotype: originally deposited in LCU, transferred to NA, then to US. Despite a search at both NA and US, it has not been located).

×*Elyleymus ontariensis*, according to Bowden (1967), comprises hybrids between *Elymus trachycaulus* (Link) Gould ex Shinners [≡ *Agropyron trachycaulum* (Link) Malte ex H.F. Lewis] and *L. innovatus* (Beal) Pilger [≡ *Elymus innovatus* Beal]. Bowden regarded it as a synonym of ×*Elyleymus hirtiflorus* (Hitchc.) Barkworth & D.R. Dewey, but the holotype of that hybrid grows outside the range of *L. innovatus*. It is interpreted as having *Leymus simplex* (Scribn. & T.A. Williams) D.R. Dewey as the *Leymus* parent.

×**Elyleymus mossii** (Lepage) Barkworth, comb. nov. Basionym: ×*Agroelymus mossii* Lepage, Nat. Canad. 92:214–215. 1965. Type: CANADA. Alberta: Near Lake Louise, in open woods, 22 Aug 1946, *E. H. Moss 7257* (holotype: ALTA 1044!).

The proposed combination reflects a difference of opinion concerning the parents of this hybrid as well as a difference in generic interpretation. Lepage (1965) stated that it was obvious that *Elymus canadensis* L. was one parent of this hybrid, but that it would be necessary to discover which species of *Agropyron* [in the traditional sense] grew in the neighborhood to determine the other parent. He gave "*Agropyron* (?) *trachycaulum*" as a possibility. Boivin (1967) agreed that *E. canadensis* but suggested that the *Agropyron* parent was *Agropyron violaceum* (Hornem.) Lange [≡ *Elymus violaceus* (Hornem.) Feilberg].

Elymus canadensis, however, is generally absent from the region around Lake Louise (Moss 1983), the area where the holotype was collected. Other features of the holotype that are difficult to reconcile with Lepage's suggested parentage are the presence of rhizomes and the abundance of relatively long soft hairs on both the lemmas and the glumes. *Elymus canadensis* is not rhizomatous, has coarse hairs on the lemmas, and has scabrous rather than hairy glumes. *Elymus trachycaulus* and its high elevation counterpart, *E. alaskanus* subsp. *latiglumis* (Scribn. & J.G. Sm.) Á. Löve, usually lack rhizomes, and have glabrous or shortly hairy lemmas and glumes. More probable parents are *Elymus glaucus* Buckley and *Leymus innovatus*, both of which are common in the region. *Elymus glaucus* has spikes that more closely resemble the holotype in their posture, thickness, and awn length than those of *E. canadensis*; *L. innovatus* has soft hairs on its glumes and lemmas. *Elymus glaucus* is sometimes shortly rhizomatous; *Leymus innovatus* is always rhizomatous. Based on this interpretation of the parentage, the hybrid has to be included in ×*Elyleymus*.

Elymus ×cayouetteorum (Boivin) Barkworth, comb. nov. BASIONYM: ×*Agrohordeum cayouetteorum* Boivin, Nat. Canad. 94:520. 1967. TYPE: QUE!

Boivin (1967) published this name for hybrids between *Elymus trachycaulus* [≡ *Agropyron trachycaulum*] and *E. canadensis*.

Elymus lanceolatus subsp. **riparius** (Scribn. & J.G. Smith) Barkworth, comb. & stat. nov. BASIONYM: *Agropyron riparium* Scribn. & J.G. Smith, Bull. Div. Agrostol., U.S.D.A. 4:35. 1897. TYPE: U.S.A. MONTANA: Garrison, 10 Jul 1895, *P.A. Rydberg 2127* (LECTOTYPE: US 556672!, designated by Hitchcock 1935:776).

After examining many specimens, I agree with Dorn (1988) that this taxon merits recognition but prefer to treat it as a subspecies rather than a variety. It is more common than *Elymus lanceolatus* (Scribn. & J.G. Sm.) Gould subsp. *lanceolatus*.

×Leydeum littorale (H.J. Hodgs. & W.W. Mitch.) Barkworth, comb. nov. BASIONYM: ×*Elymordeum littorale* H.J. Hodgs. & W.W. Mitch., Canad. J. Bot. 43:1355. 1965. TYPE: U.S.A. ALASKA: Matanuska Valley, in tidal flat area along Cottonwood Creek near juncture with Knik Arm about 18 mi SW of Palmer, 2 Sep 1964, *W.W. Mitchell & H.J. Hodgson 1584* (HOLOTYPE: ALA 29247!).

×*Leydeum littorale* consists of hybrids between *Leymus mollis* and *Hordeum brachyantherum* Nevski. It has been collected in the Matanuska Valley, Alaska, and on the coast of Vancouver Island, British Columbia and it may be more widespread. Hodgson and Mitchell (1965) stated that it grows along the margins of the high-tide zone, where tidal waters flow into the creek. The hybrid plants can easily be distinguished from *L. mollis* by their shorter narrower spikes and more yellow and dense foliage. The new combination reflects recognition of the segregate genus *Leymus*.

Leymus californicus (Bol. ex Thurber) Barkworth, comb. nov. BASIONYM: *Gymnostichum californicum* Bol. ex Thurber in S. Watson, Bot. California 2:327. 1880. *Gymnostichum californicum* Bol. ex Thurb., Bot. California 2:327. 1880. *Hystrix californica* (Bol. ex Thurb.) Kuntze, Revis. Gen. Pl. 2:778. 1891. TYPE: *Elymus californicus* (Bol. ex Thurb.) Gould, Madroño 9(4):127. 1947. U.S.A. CALIFORNIA: Redwoods, near San Francisco, *H.N. Bolander s.n.* (LECTOTYPE: GH-19493!, designated by Baden, Frederiksen & Seberg, Nordic J. Bot. 17:457. 1997).

Transfer of this taxon to *Leymus* is supported by its chromosome number of 2*n* = 56, and genome-specific RAPD assay results (Jensen & Wang 1997). It is consistent with Mason-Gamer's (2001) examination of granule-bound starch synthase genes in allotetraploid *Triticeae*. In her tree, it groups with *Psathyrostachys*, Nevski, a genus very close to *Leymus* (Bödvarsdóttir and Anamthawat-Jónsson 2003). Morphological characteristics that tend to place it in *Leymus* rather than *Elymus* include its well-developed rhizomes and the more or less equally prominent veins in its leaf blades. There are also many specimens of *L. innovatus*, particularly those from Alaska and Yukon Territory, that lack or have very reduced glumes.

The habitat of *L. californicus*, coniferous forests on non-alkaline soils, is unusual among North American species of *Leymus*. It is, however, similar to that of some Chinese species that are currently included in *Hystrix* Moench because of their lack of glumes.

Hitchcock (1935, 1951) and Baden et al. (1997) included *Leymus californicus* in *Hystrix* because it lacks glumes. The type of *Hystrix* is, however, *Elymus hystrix*, a species that, apart from lacking glumes and having strongly divergent spikelets, is morphologically, genomically, and molecularly similar to other eastern North American species of *Elymus*.

×**Pascoleymus** Barkworth, gen. hybr. nov. = *Pascopyrum* Á. Löve × *Leymus* Hochst. TYPE: *Pascoleymus bowdenii* (Boivin) Barkworth.

×**Pascoleymus bowdenii** (Boivin) Barkworth, comb. nov. BASIONYM: ×*Agroelymus bowdenii* Boivin. Nat. Canad. 94:520. 1967. TYPE: CANADA. ALBERTA: Beaverlodge, 19 Jul 1921, *M.O. Malte 108211* (HOLOTYPE: QFA!).

×*Agroelymus bowdenii* applies to hybrids between *Agropyron smithii* Rydb. [≡*Pascopyrum smithii* (Rydb.) Á. Löve] and *Elymus innovatus* [≡ *Leymus innovatus*] (Boivin 1967). Recognition of the genus *Pascopyrum* requires a new intergeneric hybrid name as well as a new combination at the species level.

Pseudoroegneria spicata f. **inermis** (Scribn. & J.G. Sm.) Barkworth, comb. nov. & stat. nov. BASIONYM: *Agropyron divergens* var. *inerme* Scribner & J.G. Sm., Bull. Div. Agrostol. U.S.D.A. 4^5:27. 1897. TYPE: U.S.A. IDAHO: 1895, *L.F. Henderson 3058* (LECTOTYPE: US-556676!, Hitchcock 1935:773).

Daubenmire (1939, 1960) reported that rhizome development and awn length in *Agropyron spicatum* (Pursh) Scribn. & J.G. Sm. [≡ *Pseudoregoegneria spicata* (Pursh) Á. Löve] varied continuously within plants grown from seed. He concluded that the ability to produce rhizomes and unawned plants is heritable, that the two characters are not linked, and that which form becomes dominant at a local site is determined by environmental conditions.

Plant breeders working with *Pseudoroegneria spicata* consider that awn presence is determined by a single major gene, modified by some minor genes, with the unawned condition being dominant. Although no one has gathered the data that explicitly tests this hypothesis, extensive work with both awned and unawned accessions of the species suggests that it is true. It means that a pair of heterozygotic unawned parents will give rise to around 50% awned offspring. This hypothesis is consistent with Daubenmire's observations.

The above observations make it clear that the awned (*P. spicata* f. *spicata*) and unawned (*P. spicata* f. *inermis*) phases of *Pseudoroegneria spicata* are of little taxonomic significance despite their evident morphological difference. The reason for making names available at the level of form is to accommodate those who wish to distinguish the two entities.

Pseudoroegneria spicata f. **pubescens** (Elmer) Barkworth, comb. nov. & stat. nov.

Basionym: *Agropyron spicatum* var. *pubescens* Elmer, Bot. Gaz. 36:52. 1903. *Agropyron spicatum* subsp. *puberulentum* Piper, Contr. U.S. Natl. Herb. 11:147. 1906, *nom. superfl.* Type: U.S.A. Washington: Kittitas Co.: Mt. Stuart, Jul 1898, *A.D.E. Elmer 1158* (holotype: Deposited in Stanford Herbarium which has been transferred to CAS; despite a search, it could not be located at CAS; isotype: US-1817092!).

Plants of *Pseudoroegneria spicata* with densely pubescent leaves are known from the east slope of the Cascade Mountains in Washington. Because plants with nearly as densely pubescent leaves are found elsewhere in southern Washington and northeastern Oregon, it seems best to recognize them as a form, *P. spicata* f. *pubescens*, commensurate in this respect with the level of recognition given the awned and unawned phases.

Publication of the above combinations automatically generates ***Pseudoroegneria spicata*** (Pursh) Á. Löve f. ***spicata*** with priority dating from 1814, the year of publication of the basionym for the specific epithet.

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